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ABSTRACT

This study was designed to determine the relationship between children's reflection-impulsivity and responses to a forced choice of a toy for play (labelled as impulsivity) and the length of continued play with the selected toy (labelled as latency). A group of twenty four-year-olds, male and female, were observed making a choice between toys. The length of time required for choice and length of continued play were observed. The Kansas Reflection-Impulsivity Scale for Preschoolers (KRISP) test, consisting of five match-to-sample practice items followed by ten test items, was administered to the children. Comparison of the KRISP latency-to-errors scores by the sample in this study reflected a negative correlation of -.197. Results of this project are illustrated by tables and graphs and an analysis is presented. (JD)

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A Study of Reflection-Impulsivity in the Play of Preschool Children

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A Study of Reflection-Impulsivity in the Play of Preschool Children

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Emphasis on the uniqueness of each individual has led early childhood educators to search for ways to connote the cognitive style of each person's mode of learning. Yet researchers are hard pressed to identify the specific processes through which each individual perceives and uses environmental stimuli. One method that has been utilized in attempting to demonstrate why persons respond differently has been the measurement of latency ("time to respond") of response to a problem and the accuracy ("number of errors") of the solutions. Such differences in children's problem-solving have been measured most frequently by noting latency and accuracy of children's responses in matching like figures in the Matching Familiar Figures Test (MFFT) (Kagan, 1964). Relationships may exist between reflection-impulsivity and information-processing (Wright & Vlietstra, 1977). Kagan (1964) referred to the reflection-impulsivity dimension as a problem-solving competence accounting for intelligence not defined by IQ or verbal facility. Subsequently, Kagan (1976) defined reflection-impulsivity as influencing the process of selection of the best solution to a problem. In the latter context, he categorized children under five years of age as having little concern with error, and, therefore, as having minimal uncertainty about solving a problem. He admitted that "we are a long way from understanding the early antecedents of reflection-impulsivity if, indeed, there are any." (p. 49)

More than two hundred publications describe the reflection-impulsivity reactions of school-aged children, but only occasionally has the question of whether or not this characteristic can be identified in the preschool child

been addressed. Katz (1972) classified 4.5 year-old children as impulsive or reflective by their error/latency standard scores from the MFFT, and observed that the impulsive subjects discriminated between forms less well than reflectives. Lewis (1968) and Massari (1973) examined the responses of disadvantaged preschoolers using the Early Childhood Matching Familiar Figures Test by Banta (1970) and found greater response-time-to-error correlations in boys than in girls. Toner, Holstein, and Hetherington (1977) concluded that a modified version of the MFFT measured the conceptual style dimension of reflection-impulsivity in children with a mean age of 4 years, and that individual differences in this dimension related to their self-regulatory behavior. Paralleling the match-to-sample testing items of the MFFT, Wright (1971) developed the Kansas Reflection-Impulsivity Scale for Preschoolers having concluded that Kagan's MFFT did not appear to work well with children younger than six to eight years (1977); this test has been used with 1,408 children, and the authors claim a "moderate degree of test-retest and alternate-form reliability;" (p. 17) negative correlations between latency and error ranged from -.168 for females to -.294 for males, and at -.228 for total subjects.

Because play is the naturalistic behavior of the preschool child, the investigators speculated that it might provide a means for observing the patterns of children's reflection-impulsivity. Other studies have outlined a cognitive hierarchy within the young child's play procedures that appear to connote their cognitive strategies (Parten, 1932; Rubin, 1976). Kagan apparently did not formally publish observations of play collected in 1965 that appeared to differentiate Slow/Accurate (reflectives) children from Fast/Inaccurates (impulsives) (Block, Block, & Harrington, 1974). If the child's responses within a play situation could be delineated, and if these could be found to be

have congruence with the latency/error components of reflection-impulsivity, then astute observation of decision-making and adherence to the decision the child has made for his own play might offer opportunities to compare reflection-impulsivity within the play patterns of young children.

The present study was designed to determine the relationship between reflection-impulsivity as measured by the KRISP and the child's responses to a forced choice of toy for play (labelled as impulsivity) and the length of continued plan with the selected toy (labelled as latency). Katz (1971) found that comparison glances by three- to five-year-old children discriminated between reflective and impulsive children. During the choice of toy for play, the children's touchings of the various possibilities and/or the glances from one toy to another were counted, as another means to assess the child as reflective or impulsive. To search for clues to the preschool child's early conceptual tempo as shown in play behaviors, this study attempted to ascertain whether or not a child's solving of the familiar problem of "what to play with" would delay selection and reflect thought processes in the number of choice comparisons before choosing a toy with which the child might play for a longer period of time. Since a preschool child's cognition is largely dependent upon problem solving through play, finding a means for predicting the preschool child's cognitive tempo would be helpful in providing optimal learning environments.

Method

Subjects. Twenty (20) children--10 males, 10 females--between 44 and 65 months were the subjects for this study. Mean age for the boys was four years, six months, and for the girls was four years, five months. The children were attending a United Way nursery, predominantly from lower socio-economic homes.

Procedures. Each subject was observed in the play situation. The investigator told each child, "I've brought some toys with me today. Would you like to play with one of my toys?" While walking with each child from the group care room, the investigator explained that there were two types of toys from which to choose: dolls or trucks. After the child made his decision of type of toy, he was told, "I brought four trucks (dolls) with me today. I'd like you to take as long as you'd like to look at all four dolls (trucks). When you decide which of the dolls (trucks) you want to play with, you may take it from the table and play with it for as long as you'd like. You may only choose one doll (truck) so look at all of the dolls (trucks) before you decide." As the child and researcher entered the "play" room, two independent observers (1) timed the "decision-time" from their entry to the child's selection of the toy for play, (2) counted the number of glances and/or touchings the child made from one toy to the other until the final decision was made by the child of the toy he/she would play with, and (3) timed the number of minutes the child played with the toy until giving the first sign of wishing to cease play with that toy--labelled "time of continuous attendance to toy." Correlations between observers for these three recorded periods of time were all above .9.

Measures. The Kansas Reflection-Impulsivity Scale for Preschoolers (KRISP) was administered to the children. It consists of five match-to-sample practice items followed by ten test items. Each item requires matching a line drawing of familiar items such as a fork, truck, etc. with one of four to six similar alternatives, only one of which is an exact copy duplicate of the standard figure.

Results

Comparison of the KRISP latency-to-errors scores by the sample in this study reflected a negative correlation of -.197. This compared with the correlation of KRISP latency/errors of the 1,408 preschool children in the Wright (1978)

report of -.228 and with -.28 median correlation in Messer's (1976) review of samples of subjects five years or younger. As can be noted from Table 1, the girls' KRISP latency/error correlation was slightly positive, whereas the negative correlation for the boys was -.644; this finding confirms that of other researchers (Lewis, 1968; Massari, 1973) concluding that boys demonstrate a greater reflection-impulsivity style effect. When boys' scores were compared with girls' on all measures to determine difference by the use of the "t" statistic, no sex differences were found.

The major purpose of this study was to determine the relationship between cognitive tempo as measured by reflection-impulsivity levels assessed by the KRISP and children's play processes. Muma (1978) indicated that the best way to identify impulsivity and reflectivity is to employ novel tasks or novel toys. The researchers hypothesized that the delay or pausing to decide which toy to play with before setting up a play activity might differentiate reflectives from impulsives as consistently or more consistently than a testing device. It was believed that the three-dimensional objects--in this case dolls and trucks--would evoke greater information-processing in order to make a decision for "what to play with" than topographical representations of objects illustrated in the line drawings of either the KRISP or other instruments for assessment of reflection-impulsivity.

Kagan (1976) conceptualized that two indirect indices within reflection-impulsivity--latency and errors--measure two different components, called efficiency (E scores) and impulsivity (I scores). Such conceptualization permits the identification of a separate maturation- and ability-related characteristic and an individual style-by-task strategy. In the present study the spontaneous and free play of the child after having selected either a doll or truck with which to play was considered to be the maturation and ability-related characteristic--

to connote "latency," and each of the components of glances and touchings of the toy prior to making the decision of which one with which to play and the time required to arrive at the decision were separately considered as possible discriminators of an individual's style-by-task strategy--to connote information process called "errors" in the KRISP and other measurements of impulsivity. Salkind and Wright (1977) argued that defects occurring when raw scores were used in the identification of reflectives and impulsives would be corrected if MFFT performance were analyzed using standard ("z") scores to derive Impulsivity (I) and Efficiency (E) scores. Raw scores for KRISP latency/error were graphed according to traditional classification methods (Wright, 1973) sh shown in the pink sheet. Derivation of the Impulsivity and Efficiency scores from standard scores assigns continuous scores to all subjects tested. The formulae:

$$\text{Impulsivity} = \frac{(z\ \text{error}) - (z\ \text{latency})}{2} \quad \text{and} \quad \text{Efficiency} = \frac{(z\ \text{error}) + (z\ \text{latency})}{2}$$

were used. The formulae allow for an impulsivity rating and an efficiency rating for all subjects. "Z" scores for the KRISP raw scores of latency/error were computed and graphed as shown on the yellow sheet.

To determine whether or not this sample of children could be perceived as reflectives or impulsives from their decision regarding toy selection and their period of play with the toy, the raw scores for play time, glances/touchings of the toys until one was selected, and time until selection of toy (decision-time) were converted to standard "z" scores. The integrated model of Salkind and Wright (1977) was graphed using play time to characterize "efficiency" and using separate computations of glances/touchings and decision-time with play time to connote "impulsivity/reflection"--as shown on the green and blue pages, respectively. The chart, "Identification of Sample Children," shows how each of the models characterizes the reflection-impulsivity of each child, as "fast/accurate," "fast/inaccurate," "slow/accurate," or "slow/inaccurate." Thirteen of the 20

children were labelled similarly by the KRISP traditional graphing and the integrated model. Fifteen of the 20 children were labelled similarly whether glances were used with play time or decision time was used with play time. Seven of the 20 children were labelled similarly by the KRISP integrated model and the Play Time-Decision comparisons. Six of the 20 children were labelled similarly by the KRISP integrated model and the Play Time-Glances comparisons. Three children--# 10, 12, & 17--were labelled as having exactly the same elements of impulsivity and efficiency by all four methods.

Means of reflectives and impulsives for all measures were analyzed to determine levels of difference, as shown below in Table 2.

Correlations of Measures TABLE 1

TOTAL SCORES	KRISP Errors	Play Decision	No. of Glances, Touchings	Play Time
KRISP Latency	-.197	.302	.097	-.290
Play (Toy) Decision	-.185	X	.830	.278
Number of Tchgs./Glances	-.198	.830	X	.518
Play Time	-.096	.278	.518	X
GIRLS' SCORES				
KRISP Latency	.067	.799	.551	-.315
Play (Toy) Decision	.529	X	.808	-.286
Number of Tchgs./Glances	.495	.808	X	.089
Play Time	-.056	-.286	.089	X
BOYS' SCORES				
KRISP Latency	-.644	.186	-.148	-.221
Play (Toy) Decision	-.521	X	.837	.520
Number of Tchgs./Glances	-.406	.837	X	.753
Play Time	-.124	.520	.753	X

Difference - Reflectives/Impulsives. TABLE 2

MEASURE		MEAN	"t"	p
KRISP - latency	for reflectives	.10414	1.18	n.s.
	for impulsives	.0535		
KRISP - errors	for reflectives	8.43	.7176	n.s.
	for impulsives	11.923		
Glances/Touchings	for reflectives	5.045	1.32	n.s.
	for impulsives	2.61		
Decision Time	for reflectives	.7438	2.397	.05*
	for impulsives	.03978		

* two-tailed

All comparisons of means of the scores on the measures above in Table 2 to determine difference between impulsives and reflectives approached significance except the mean difference of the KRISP errors between impulsives and reflectives. Mean differences differentiating impulsives from reflectives were significant when comparing the time for deciding what toy with which to play.

Discussion

The data raise some interesting questions about the use of artificial assessment devices for measuring reflection-impulsivity in the young child. Differences between the dimensions of reflection and impulsivity seem to be distinguished for this sample of low socio-economic children by observation of reflectives' significantly longer length of time required to make a decision about what toy with which to play during a naturalistic, spontaneous play period.

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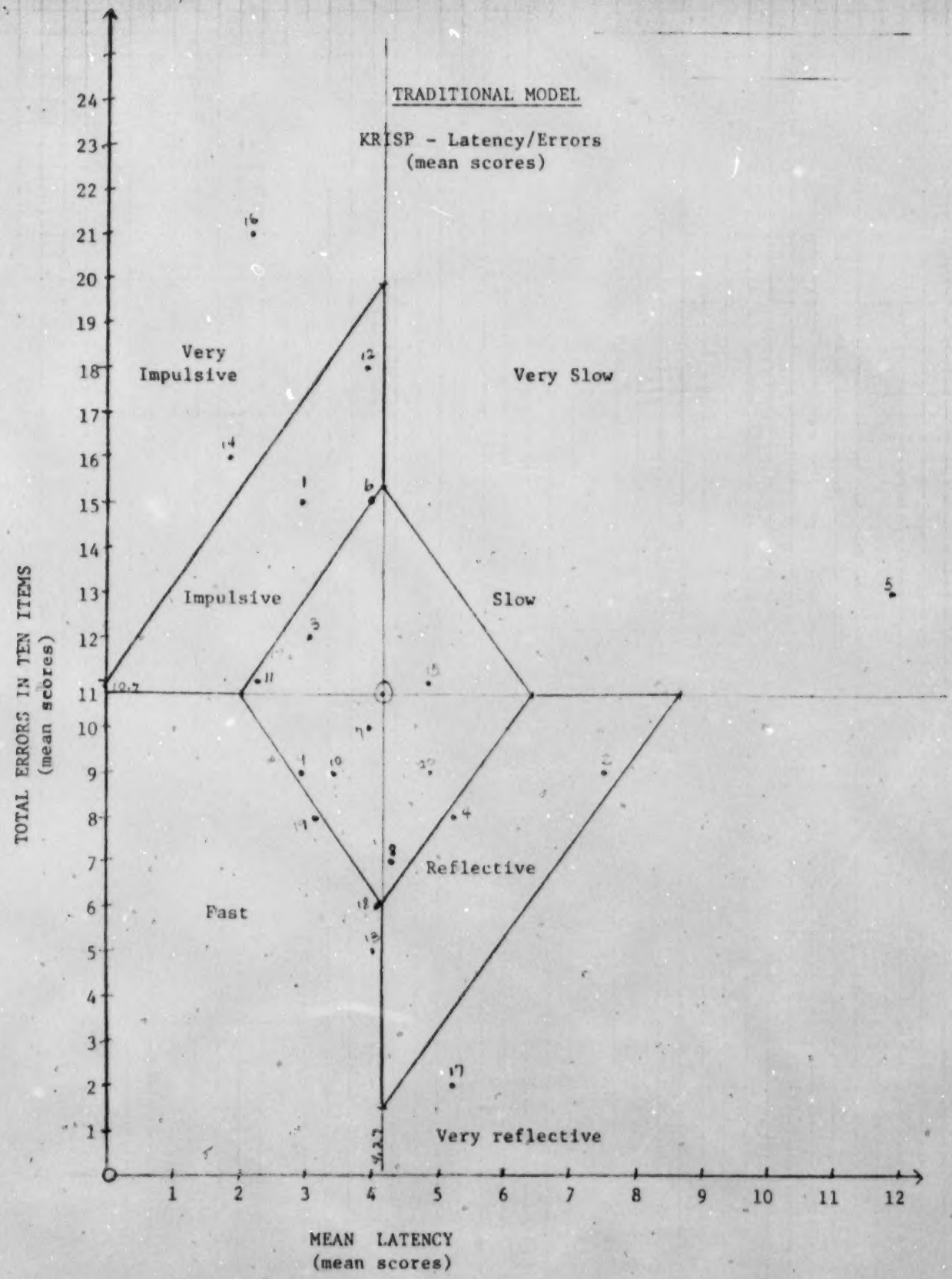
TRADITIONAL MODEL KRISP-Latency/Errors (mean scores)				INTEGRATED MODEL KRISP-Latency/Errors (z - scores)				INTEGRATED MODEL Play Time/Glcs. & Tchg. (z - scores)				INTEGRATED MODEL Play Time/Decision Time (z - scores)				
F-A	F-I	S-A	S-I	F-A	F-I	S-A	S-I	F-A	F-I	S-A	S-I	F-A	F-I	S-A	S-I	
	X				X						X				X	1
		X					X				X				X	2
	X			X				X				X				3
		X				X					X				X	4
			X				X			X				X		5
	X				X				X						X	6
X				X							X		X			7
		X				X			X				X			8
X				X					X						X	9
X				X				X				X				10
	X			X						X				X		11
	X				X				X				X			12
X						X					X		X			13
	X			X				X				X				14
			X				X	X				X				15
	X				X						X				X	16
		X				X				X				X		17
X						X			X				X			18
X						X					X				X	19
		X				X					X				X	20

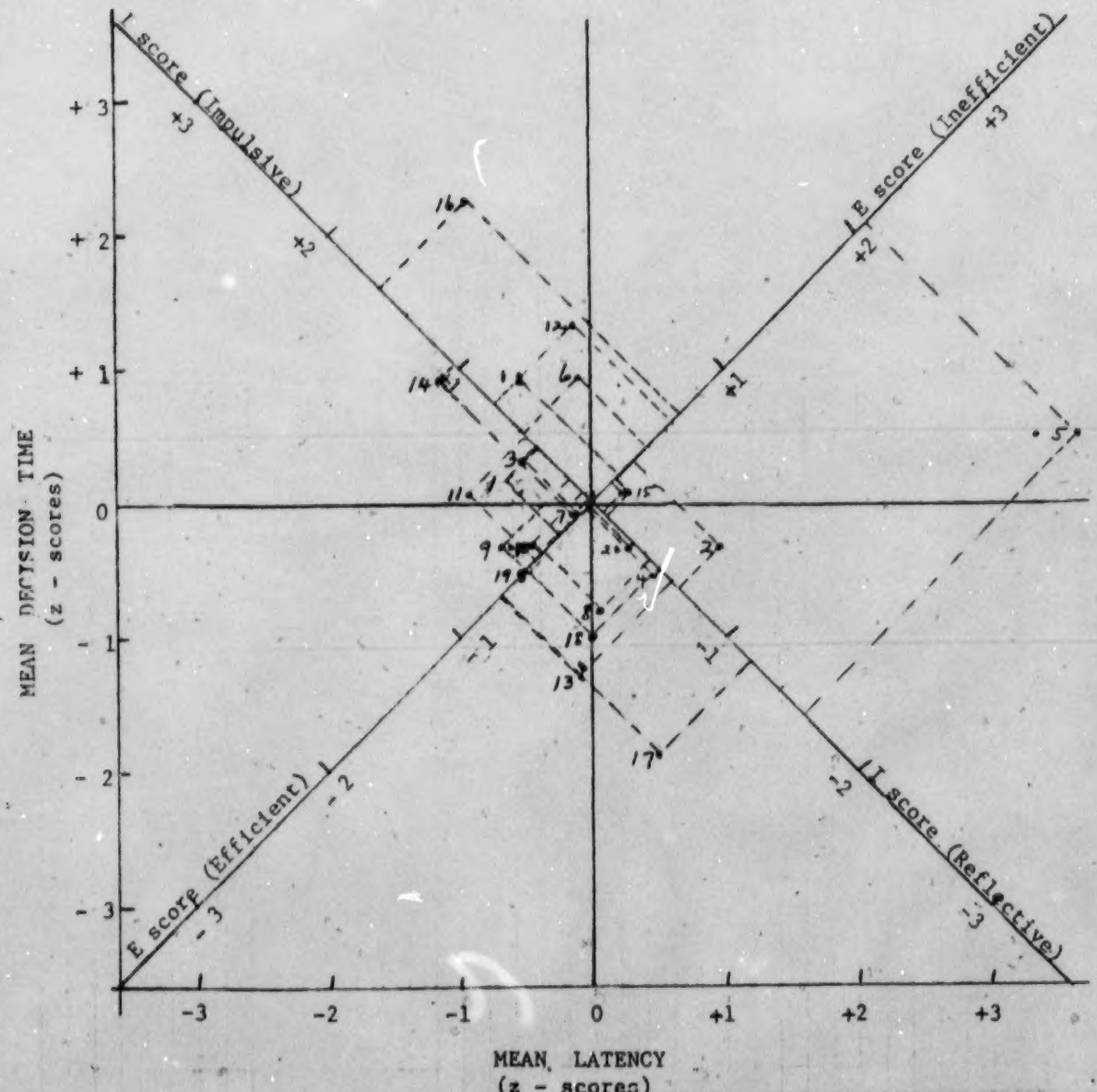
IDENTIFICATION OF SAMPLE CHILDREN AS

Fast/Accurate Slow/Accurate
Fast/Inaccurate Slow/Inaccurate


TRADITIONAL MODEL
KRISP - Latency/Errors
(mean scores)
Very
Impulsive
Very Slow
Impulsive
Slow
Reflective
Fast
Very reflective
TOTAL ERRORS IN TEN ITEMS
(mean scores)
MEAN LATENCY
(mean scores)

INTEGRATED MODEL

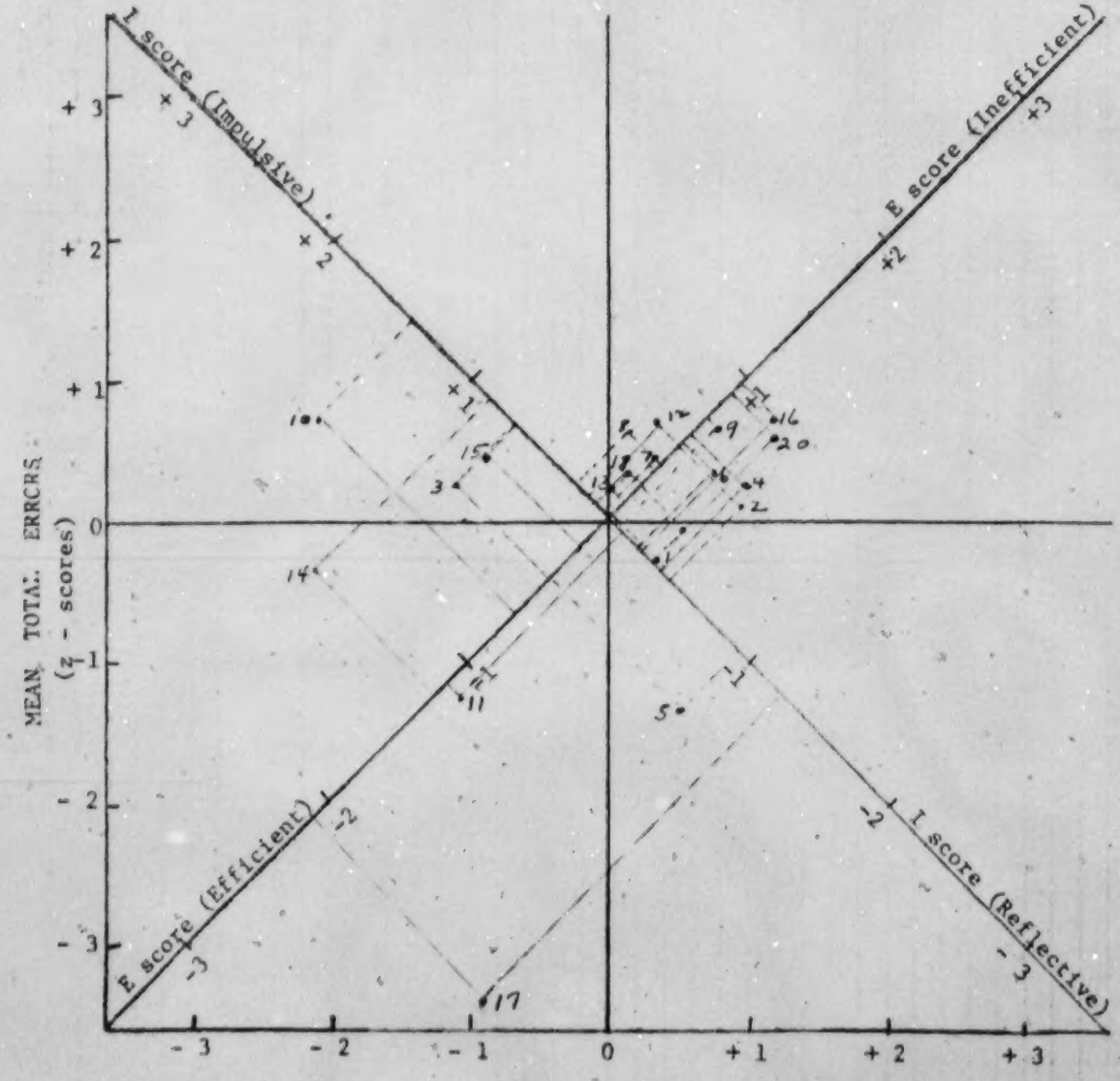
KRISP - Latency/Errors
(z - scores)



Fast/Accurate	=	positive I score negative E score
Fast/Inaccurate	=	positive I score positive E score
Slow/Accurate	=	negative I score negative E score
Slow/Inaccurate	=	negative I score positive E score

INTEGRATED MODEL

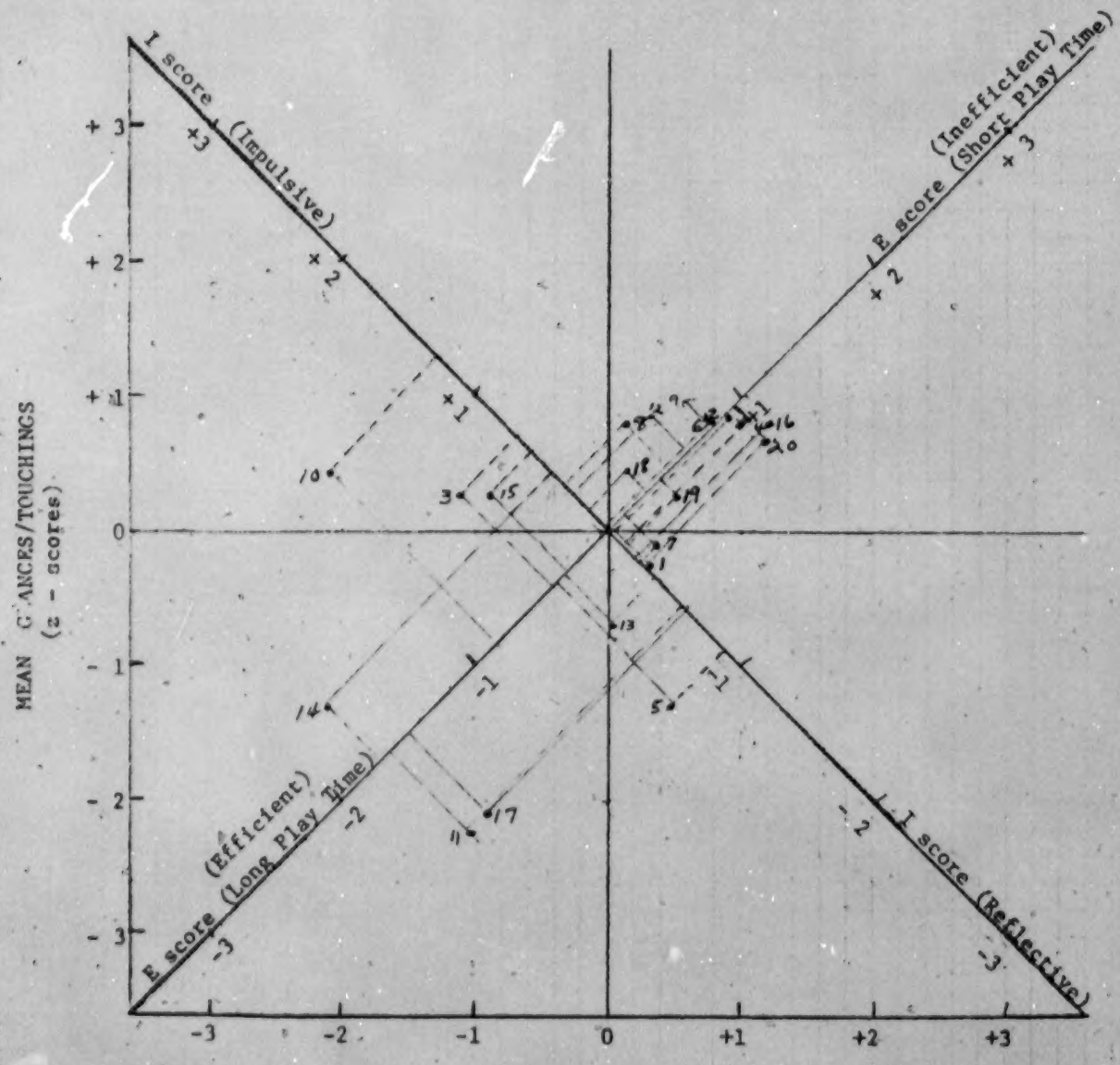
Play Time / Decision Time
(Efficiency) (Impulsivity/Reflection)
(z - scores)



Fast/Accurate	=	positive I score negative E score
Fast/Inaccurate	=	positive I score positive E score
Slow/Accurate	=	negative I score negative E score
Slow/Inaccurate	=	negative I score positive E score

INTEGRATED MODEL

Play Time / Glances & Touchings
(Efficiency) (Impulsivity/Reflection)
(z - scores)



Fast/Accurate	=	positive I score negative E score
Fast/Inaccurate	=	positive I score positive E score
Slow/Accurate	=	negative I score negative E score
Slow/Inaccurate	=	negative I score positive E score